BOOK NOTICE

Fleas of Western North America. Their Relation to the Public Health; by Clarence Andresen Hubbard; pp. i–ix + 1–533, 5 half-tone plates, and many text figures. 1947. (The Iowa State College Press, Ames, Iowa. $6.00).

This companion volume to Irving Fox' "Fleas of Eastern United States," from the same Press (1940), far outstrips in scope any similar attempt in the field of the Siphonaptera. It is a handsome book, clearly printed and attractively bound.

The work opens with a history of the study of fleas in western North America, a feature to which entomologists are little accustomed. In a brief but competent discussion of fleas and disease it is stated that, since the introduction of bubonic plague in the United States in 1900, there have been 506 human cases, 321 of them fatal. It is to be feared, nevertheless, that the author's "Word of Warning" will fall upon deaf ears. Collecting ectoparasites is not a normal activity of the average entomologist. Hubbard describes in detail the special techniques involved in trapping the hosts, gathering the fleas, and mounting the specimens for study.

The chapter on the external anatomy of the flea is disappointing. For advanced students it could have been omitted altogether; while it is far too sketchy to meet the beginner's needs. Even some terms used in the main body of the book—such as pygidium, mesosternite and mesopleurite—are not explained.

The foregoing general topics cover a bare 40 pages, the bulk of the treatise being a detailed taxonomic study of 236 species and subspecies of Siphonaptera known to the author from North America west of the 100th Meridian. These he classifies in 5 families and 66 genera. Keys are provided for the identification of families and genera, and for the species and subspecies of most genera, with the exception of *Ceratophyllus* and *Megarthroglossus*. However, some of the keys to species are based on males only. Type locality and type host are given for nearly

every form; but the present location of the types is omitted in most cases. The descriptions are clear and the many illustrations of details, comparing closely allied forms are most commendable.

Only 12 of the 302 fleas listed from America north of Mexico extend across the continent; and this number dwindles to 5 (one of them doubtfully in the East) after eliminating 7 species introduced from the Old World by man. The eastern flea fauna is, moreover, scanty, only 56 species and subspecies being known from east of the 100th Meridian, as against 236 from the western area. The explanation lies, of course, in the extremely poor mammalian fauna of the eastern area. The author has relied too exclusively on Irving Fox' book (1940) for his information on eastern fleas. H. S. Fuller in 1943 raised the number of species known from Vermont to 15 (not *one,* as stated by Hubbard), and recorded 9 species from West Virginia, from which state Hubbard says there are no published records.

In the careful and elaborate analysis of host relationships, the notes on the characteristics and behavior of the several types of hosts will be particularly useful. The relations between blood-sucking ectoparasites and their hosts are not merely those of taking and giving food. The parasite's structure, life-history and behavior are in most cases closely correlated with those of the host. The author's detailed information on the relative abundance of the several species of fleas often found on the same host may help to determine the normal or breeding, and the accidental or stray hosts of each species, leading eventually to the study of the factors determining the choice of the host.

The author is to be congratulated on his book, which crowns some fifteen years of field and laboratory work carried on with unusual enthusiasm.—J. Bequaert